[4910-13]

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 27

[Docket No.FAA-2017-1130; Notice No. 27-043-SC]

Special Conditions: Airbus Helicopters Model AS350B2 and AS350B3 Helicopters; Installation of Garmin International, Inc., Autopilot System

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Final special conditions.

SUMMARY: These special conditions are issued for Airbus Helicopters Model AS350B2 and AS350B3 helicopters. These helicopters as modified by Garmin International, Inc., (Garmin) will have a novel or unusual design feature associated with the Garmin Flight Control (GFC) 600H autopilot with stability and control augmentation system (AP/SCAS). The applicable airworthiness regulations do not contain adequate or appropriate safety standards for this design feature. These special conditions contain the additional safety standards that the Administrator considers necessary to establish a level of safety equivalent to that established by the existing airworthiness standards.

DATES: The effective date of these special conditions is [Insert date of publication in the Federal Register].

FOR FURTHER INFORMATION CONTACT: George Harrum, Aerospace Engineer, FAA, Rotorcraft Standards Branch, Policy and Innovations Division, 10101 Hillwood Pkwy, Fort Worth, TX 76177; telephone (817) 222-4087; email George.Harrum@faa.gov.

SUPPLEMENTARY INFORMATION:

Background

On October 10, 2016, Garmin applied for a supplemental type certificate (STC) to install a GFC 600H AP/SCAS in Airbus Helicopters Model AS350B2 and AS350B3 helicopters. The Model AS350B2 and AS350B3 helicopters are 14 CFR part 27 normal category, single turbine engine, conventional helicopters designed for civil operation. These helicopter models are capable of carrying up to five passengers with one pilot and have a maximum gross weight of up to 5,220 pounds, depending on the model configuration. The major design features include a 3-blade, fully articulated main rotor, an anti-torque tail rotor system, a skid landing gear, and a visual flight rule basic avionics configuration.

Garmin proposes to modify these model helicopters by installing a SCAS with autopilot functions in 2 or 3 axes, depending on the number of servos installed. The possible failure conditions for this system, and their effect on the continued safe flight and landing of the helicopter, are more severe than those envisioned by the present rules. The present 14 CFR 27.1309(b) and (c) regulations do not adequately address the safety requirements for systems whose failures could result in "catastrophic" or "hazardous/severe-major" failure conditions, or for complex systems whose failures could result in "major" failure conditions. When these rules were promulgated, it was not envisioned that a normal category rotorcraft would use systems that are complex or whose failure could result in "catastrophic" or "hazardous/severe-major" effects on the rotorcraft. This is particularly true with the application of new technology, new application of standard technology, or other applications not envisioned by the rule that affect safety. The Garmin AP/SCAS controls rotorcraft flight control surfaces. Possible failure modes exhibited by this system could result in a catastrophic event.

Type Certification Basis

Under 14 CFR 21.101 and 21.115, Garmin must show that the Airbus Helicopters Model AS350B2 and AS350B3 helicopters, as changed, continue to meet the applicable provisions of the regulations incorporated by reference in Type Certificate No. H9EU or the applicable regulations in effect on the date of application for the change. The regulations incorporated by reference in the type certificate are commonly referred to as the “original type certification basis." The regulations incorporated by reference in Type Certificate No. H9EU are as follows:

14 CFR 21.29 and part 27 effective February 1, 1965, plus Amendments 27-1 through 27-10.

For aircraft incorporating mod. OP3369 (2370 kg/5225 lb mass extension), the following 14 CFR part 27 Amendments 27-1 through 27-40 are replacing the same requirement from the certification basis above: §§27.1; 27.21; 27.25; 27.27; 27.33; 27.45; 27.51; 27.65; 27.71; 27.73; 27.75; 27.79; 27.141; 27.143; 27.173; 27.175; 27.177; 27.241; 27.301; 27.303; 27.305; 27.307; 27.309; 27.321; 27.337; 27.339; 27.341; 27.351; 27.471; 27.473; 27.501; 27.505; 27.521; 27.547; 27.549; 27.563(b); 27.571; 27.602; 27.661; 27.663; 27.695; 27.723; 27.725; 27.727; 27.737; 27.751; 27.753; 27.801(b)(d); 27.927(c); 27.1041; 27.1043; 27.1045; 27.1301; 27.1501; 27.1519; 27.1529; 27.1581; 27.1583; 27.1585; 27.1587; 27.1589.

For AS350B3 aircraft incorporating mod. OP-4605 (installation of a fuel system improving crashworthiness), 14 CFR 27.561(c) at Amendment 27-32 replaces the same requirement from the certification basis above for the following elements of the fuel tank lower structure affected by this modification: cradles, longitudinal beams, X-stops and rods.

Additionally, Garmin must comply with the equivalent level of safety findings, exemptions, and special conditions prescribed by the Administrator as part of the certification basis.

The Administrator has determined the applicable airworthiness regulations (that is, 14 CFR part 27), as they pertain to this STC, do not contain adequate or appropriate safety standards for the Airbus Helicopters Model AS350B2 and AS350B3 helicopters because of a novel or unusual design feature. Therefore, we propose to prescribe these special conditions under § 21.16.

Special conditions are initially applicable to the model for which they are issued. Should the applicant apply for an STC to change any other model included on the same type certificate to incorporate the same or similar novel or unusual design feature, the special conditions would also apply to the other model under § 21.101.

In addition to the applicable airworthiness regulations and special conditions, Garmin must show that the Airbus Helicopters Model AS350B2 and AS350B3 helicopters, as changed, comply with the noise certification requirements of 14 CFR part 36.

The FAA issues special conditions, as defined in 14 CFR 11.19, in accordance with § 11.38 and they become part of the type certification basis under § 21.101.

Novel or Unusual Design Features

The Airbus Helicopters Model AS350B2 and AS350B3 helicopter incorporates the following novel or unusual design features: a GFC 600H AP/SCAS. This GFC 600H AP/SCAS performs non-critical control functions. The GFC 600H AP/SCAS is a two or three axis system with the following novel functions: limit cueing, level mode, and hover assist.

Discussion

These special conditions clarify the requirement to perform a proper failure analysis and also recognizes that the severity of failures can vary. Current industry standards and practices recognize five failure condition categories: Catastrophic, Hazardous, Major, Minor, and No-

Safety Effect. These special conditions address the safety requirement for systems whose failures could result in catastrophic or hazardous/severe-major failure conditions and for complex systems whose failures could result in major failure conditions.

To comply with the provisions of the special conditions, we require that Garmin provide the FAA with a systems safety assessment (SSA) for the final GFC 600H AP/SCAS installation configuration that adequately address the safety objectives established by a functional hazard assessment (FHA) and a preliminary system safety assessment (PSSA), including the fault tree analysis (FTA). This ensures that all failure conditions and their resulting effects are adequately addressed for the installed GFC 600H AP/SCAS. The SSA process, FHA, PSSA, and FTA are all parts of the overall safety assessment process discussed in FAA Advisory Circular 27-1B, Certification of Normal Category Rotorcraft, and Society of Automotive Engineers document Aerospace Recommended Practice 4761, Guidelines and Methods for Conducting the Safety Assessment Process on Civil Airborne Systems and Equipment.

These special conditions require that the GFC 600H AP/SCAS installed on Airbus Helicopters Model AS350B2 and Model AS350B3 helicopters meet the requirements to adequately address the failure effects identified by the FHA, and subsequently verified by the SSA, within the defined design integrity requirements.

Comments

No comments were received in response to the Notice of proposed special conditions No. 27-043-SC (82 FR 57685, December 7, 2017). The closing date for comments was January 22, 2018. Accordingly, the special conditions are adopted as proposed.

Applicability

As discussed above, these special conditions are applicable to Airbus Helicopters Model AS350B2 and AS350B3 helicopters. Should Garmin apply at a later date for an STC to modify any other model included on Type Certificate Number H9EU to incorporate the same novel or unusual design feature, these special conditions would apply to that model as well.

Conclusion

This action affects only certain novel or unusual design features on two model helicopters. It is not a rule of general applicability and affects only the applicant who applied to the FAA for approval of these features.

List of Subjects in 14 CFR Part 27

Aircraft, Aviation safety, Reporting and recordkeeping requirements.

The authority citation for these special conditions is as follows:

Authority: 49 U.S.C. 106(g), 40113, 44701, 44702, 44704.

The Special Conditions

Accordingly, pursuant to the authority delegated to me by the Administrator, the following special conditions are issued as part of the type certification basis for Airbus Helicopters Model AS350B2 and AS350B3 helicopters modified by Garmin International, Inc. (Garmin).

Instead of the requirements of 14 CFR 27.1309(b) and (c), the following must be met for certification of the Garmin Flight Control 600H autopilot with stability and control augmentation system:

(a) The equipment and systems must be designed and installed so that any equipment and system does not adversely affect the safety of the rotorcraft or its occupants.

(b) The rotorcraft systems and associated components considered separately and in relation to other systems, must be designed and installed so that:

(1) The occurrence of any catastrophic failure condition is extremely improbable;

(2) The occurrence of any hazardous failure condition is extremely remote; and

(3) The occurrence of any major failure condition is remote.

(c) Information concerning an unsafe system operating condition must be provided in a timely manner to the crew to enable them to take appropriate corrective action. An appropriate alert must be provided if immediate pilot awareness and immediate or subsequent corrective action is required. Systems and controls, including indications and annunciations, must be designed to minimize crew errors which could create additional hazards.

Issued in Fort Worth, Texas on March 30, 2018.

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